



COURSE OUTLINE: MPT232 - DIESEL FUEL/EMISSION

Prepared: Sylvain Belanger

Approved: Corey Meunier, Chair, Technology and Skilled Trades

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| Course Code: Title | MPT232: DIESEL ALTERNATE/CONVENT. FUEL EMISSIONS |
| Program Number: Name | 4044: MOT POWER ADV REPAIR |
| Department: | MOTIVE POWER |
| Semesters/Terms: | 20F |
| Course Description: | In this course, you will learn operating principles, trouble shooting and servicing techniques used in diesel fuel systems and subsystems. The course will focus on current past and present fuel systems .It will also explore more environmentally friendly green alternate fuels. Emission control systems will be studied focusing on pollutants and their effect on the environment. |
| Total Credits: | 3 |
| Hours/Week: | 3 |
| Total Hours: | 24 |
| Prerequisites: | MPF103, MPF124 |
| Corequisites: | There are no co-requisites for this course. |
| Vocational Learning Outcomes (VLO's) addressed in this course: Please refer to program web page for a complete listing of program outcomes where applicable. | 4044 - MOT POWER ADV REPAIR VLO 1 Analyse, diagnose, and solve various motive power system problems by using problem-solving and critical thinking skills and strategies and by applying fundamental knowledge of motor vehicle operation, components, and their interrelationships. VLO 4 Diagnose and repair electrical, electronic, personal safety, and emission components and systems in compliance with manufacturer's recommendations. VLO 7 Disassemble and assemble components to required specifications by applying workshop skills and knowledge of basic shop practices. VLO 8 Select and use a variety of troubleshooting techniques and test equipment to assess electronic circuits, vehicle systems, and subsystems. VLO 10 Communicate information effectively, credibly, and accurately by producing supporting documentation to appropriate standards. VLO 11 Use information technology and computer skills to support work in a motive power environment. VLO 16 Complete all assigned work in compliance with occupational, health, safety, and environmental law; established policies and procedures; codes and regulations; and in accordance with ethical principles. |
| Essential Employability Skills (EES) addressed in this course: | EES 1 Communicate clearly, concisely and correctly in the written, spoken, and visual form that fulfills the purpose and meets the needs of the audience. EES 2 Respond to written, spoken, or visual messages in a manner that ensures effective communication. |

In response to public health requirements pertaining to the COVID19 pandemic, course delivery and assessment traditionally delivered in-class, may occur remotely either in whole or in part in the 2020-2021 academic year.



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| | <p>EES 3 Execute mathematical operations accurately.</p> <p>EES 4 Apply a systematic approach to solve problems.</p> <p>EES 5 Use a variety of thinking skills to anticipate and solve problems.</p> <p>EES 6 Locate, select, organize, and document information using appropriate technology and information systems.</p> <p>EES 7 Analyze, evaluate, and apply relevant information from a variety of sources.</p> <p>EES 8 Show respect for the diverse opinions, values, belief systems, and contributions of others.</p> <p>EES 9 Interact with others in groups or teams that contribute to effective working relationships and the achievement of goals.</p> <p>EES 10 Manage the use of time and other resources to complete projects.</p> <p>EES 11 Take responsibility for ones own actions, decisions, and consequences.</p> | | | | |
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| Course Evaluation: | <p>Passing Grade: 50%, D</p> <p>A minimum program GPA of 2.0 or higher where program specific standards exist is required for graduation.</p> | | | | |
| Other Course Evaluation & Assessment Requirements: | <p>The following semester grades will be assigned to students:</p> <p>Grade Definition Grade Point Equivalent A+ 90 - 100% 4.00 A 80 - 89% B 70 - 79% 3.00 C 60 - 69% 2.00 D 50 - 59% 1.00 F (Fail) 49% and below 0.00</p> <p>CR (Credit) Credit for diploma requirements has been awarded. S Satisfactory achievement in field /clinical placement or non-graded subject area. U Unsatisfactory achievement in field/clinical placement or non-graded subject area. X A temporary grade limited to situations with extenuating circumstances giving a student additional time to complete the requirements for a course. NR Grade not reported to Registrar's office. W Student has withdrawn from the course without academic penalty.</p> | | | | |
| Books and Required Resources: | <p>medium/heavy duty truck engines,fuels and computerized management systems by Sean Bennett Publisher: cengage</p> | | | | |
| Course Outcomes and Learning Objectives: | <table border="1"> <thead> <tr> <th>Course Outcome 1</th><th>Learning Objectives for Course Outcome 1</th></tr> </thead> <tbody> <tr> <td>Describe, identify and test the components in a hydro-mechanical port helix injection system.</td><td> <ul style="list-style-type: none"> List and describe the components required to supply and control the air and fuel requirements to the engine for startup, idle, rated speed, deceleration, high idle and emission conditions. Describe the component and function of the low pressure </td></tr> </tbody> </table> | Course Outcome 1 | Learning Objectives for Course Outcome 1 | Describe, identify and test the components in a hydro-mechanical port helix injection system. | <ul style="list-style-type: none"> List and describe the components required to supply and control the air and fuel requirements to the engine for startup, idle, rated speed, deceleration, high idle and emission conditions. Describe the component and function of the low pressure |
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| | <p>supply system.</p> <ul style="list-style-type: none"> • List and describe the operation of the components of the high pressure injection system. • Test the low pressure supply system. • Diagnose faulty mechanical injectors • Remove, install and time a port helix injection pump • Inspect the timing advance mechanism of a inline mechanical injection pump. |
| Course Outcome 2 | Learning Objectives for Course Outcome 2 |
| Differentiate the differences in operation of inlet metering and sleeve metering types of rotary diesel injection pumps and the differences in components. | <ul style="list-style-type: none"> • Describe the difference in operation between the inlet metering pump and the sleeve metering injection pump. • Test the supply system on a rotary injection pump • Remove, install and time a rotary injection pump to an engine. |
| Course Outcome 3 | Learning Objectives for Course Outcome 3 |
| Define the role of computer controlled electronic diesel fuel injection systems and perform diagnostic procedures. | <ul style="list-style-type: none"> • Identify the differences between partial authority and full authority electronic engine management systems. • Describe the construction and operation of input and output devices. • Describe how an ECM processes inputs and uses programmed data to generate outputs. • Utilize electronic service tools to extract data • Diagnose system codes. • Capture a vehicle data log and analyze results. |
| Course Outcome 4 | Learning Objectives for Course Outcome 4 |
| Describe, identify and test Diesel Fuel Injection Nozzles | <ul style="list-style-type: none"> • Describe the principal of operation and purpose of hydro-mechanical injectors • Describe the principles of operation of electro-hydraulic, electronic unit injector and piezoelectric injectors. • Remove and bench test (pop) a hydraulic injector nozzle and reinstall. • Perform a balance test on electronic injectors using the electronic test tool and manufactures software program. • Remove and replace a mechanical injector. • Diagnose a faulty injector. |
| Course Outcome 5 | Learning Objectives for Course Outcome 5 |
| Describe, identify and test Diesel Engine Emission Systems and Regulations | <ul style="list-style-type: none"> • Define the types of emission produced by diesel engine combustion. • List the components used to reduce and control the output of emissions • List the limit for output of oxides of nitrogen (NOX) according to government regulations. • Describe the method of testing for particulate matter on the diesel engine. |

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| | | <ul style="list-style-type: none">• Perform a SAE J1667 opacity smoke test procedure and correlate test failures to an engine or management malfunction.• Outline the operating principals of EGR valves, diesel particulate filters and catalytic converters. |
| | Course Outcome 6 | Learning Objectives for Course Outcome 6 |
| | Describe, identify and test Diesel Engine Governors | <ul style="list-style-type: none">• Define the function of the diesel engine governor• Identify the different types of engine governors• Describe the operation of a Variable speed governor, a limiting speed governor and a isochronous governor.• Diagnose the symptoms of a faulty governor. |

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| Evaluation Process and Grading System: | Evaluation Type | Evaluation Weight |
| | shop and employability | 45% |
| | theory testing | 55% |

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| Date: | September 2, 2020 |
| Addendum: | Please refer to the course outline addendum on the Learning Management System for further information. |

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